ENTOMOLOGY.—*Cockroach egg case from the Eocene of Wyoming.*[1]

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Alive or long since dead, cockroaches seem to get into the U. S. National Museum with comparative ease. Sometimes, of a morning, when I open my desk I am disagreeably startled to find a large individual of *Periplaneta americana* waving its long, sensitive antennae at me warily by way of what, with some reservations, might be called a blattoid greeting. If the insect is motivated by good feeling, that emotion is not reciprocated by me, for I wholeheartedly detest these pestiferous, prolific, and repulsive creatures. Their lumbering flight through the air, their quick, furtive dash to safety in the nearest, impossible crevice, and their well-known filthy, destructive habits are neither beautiful to behold nor pleasant to contemplate. Fortunately, in some quarters at least, they are kept under control by species of flies and wasps that parasitize their eggs.

Fossil remains of ancient cockroaches are not uncommon in the plant collections that come to the Museum from many different localities, particularly those in the coal measures of Paleozoic age. Most of these fossils are impressions of wings (tegmina), entire specimens being seldom found. Perhaps the wings, tough and without appreciable nutriment, were discarded by predators, or the soft body parts decayed before the insect could be entombed in sediments. Examples of cockroaches, sometimes 10 cm long, are included in nearly every museum restoration of a Carboniferous swamp with its ferns, calamites, lepidodendrons, cordaites, and other vegetation. The cockroach line, however, continued through the succeeding geologic periods to the present with its estimated 3,500 species. Some South American species of *Megaloblatta* contain individuals that equal those of the Paleozoic in overall size.

In such a plant collection, taken in 1949 by Dr. J. B. Reeside, Jr., of the U. S. Geological Survey, from reddish, baked shale lying above a burned coal bed in lower Eocene strata of Wasatch age about 18 miles north of Wamsutter, Wyo., I found a small, squarish capsule (Fig. 2) that seems identifiable only as the egg case (oötheca) of a cockroach. This capsule is 3 mm long and 2 mm wide, but somewhat longer at the top than at the bottom. The top, as the specimen is here oriented, is apparently the the dehiscent or sutural crest and is bordered by a narrow flange that is faintly undulant, fluted, or notched. Seven vertical lines, equally spaced, indicate the internal egg chambers. As only one side of the specimen is visible the beholder, knowing that the capsules of living cockroaches, viewed from above, are seen to consist of two rows of alternating compartments, may perhaps be somewhat disappointed. Such, however, is often the nature of fossil material for which appropriate allowance must be made.

The oöthecae of most cockroaches are protruded lengthwise, the sutural crest being toward the dorsal (upper) side of the parturient insect, as shown well by Roth and Willis (1954, pl. 5). Not all living species lay such external, chitinous packages. Those that do not are more or less viviparous, the young emerging from an internal oötheca enclosed in a brood pouch. Roughly, the fossil capsule can be matched by the small egg cases of some existing cockroaches, but, as the cases of living cockroaches differ greatly in size, shape, and ornamentation (Shelford, 1912, p. 283) it seems futile to guess about the relationship of the fossil to any living species. If the female that laid this oötheca was proportional to the egg case in size it must have belonged to a small-sized species.

Thus far I have found only five previous records of fossils purporting to be cockroach oöthecae. All these fossils are from the coal measures of the late Paleozoic. Three are illustrated by Handlirsch (1908, p. 181, pl.

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18, fig. 49 [originally figured by Sellards, 1904, p. 133, fig. 25], from Pennsylvanian strata at Lawrence, Kansas; fig. 47 [later photograhed by Schlechtendal, 1912, pl. 4, fig. 32], from the Carboniferous at Dölau in Saxony; and fig. 48, from the Carboniferous at Wettin in Saxony). Two are illustrated by Pruvost (1919, p. 244, pl. 22, fig. 16, text fig. 34, from the Westphalian stage of the Carboniferous at Aniche, France; pl. 22, fig. 15, text fig. 35, from the Westphalian at Lievin, France [see also Laurentiaux, 1951, p. 193, pl. 1, fig. 1].

None of these five specimens, judged from the illustrations, is completely satisfying as a cockroach oötheca comparable to examples from living species. Except the two by Pruvost, the illustrations depict fragmentary and featureless material. Sellard's specimen is figured as a curved, irregular outline, 15 millimeters long and 5 millimeters wide, with only a dim suggestion of ornamentation along the upper (assumed) dehiscence margin and a rounded notch on the lower margin. I was unsuccessful in obtaining this specimen for examination and in eliciting any further information from Dr. Sellards. His original report contains no description of the specimen but says only that it "has a striking resemblance to the egg cases of modern cockroaches" (Sellards, 1904, p. 120, 134). One might compare it casually and doubtfully with the oöthecae of living species of *Latiblattella*.

Handlirsch's figure 47 might be interpreted as a wing fragment of a cockroach or other insect. It contains minute cross venation not visible in the photograph given by Schlechtendal. Handlirsch's figure 48 simulates a stack of small coins, except that the bottom segment is rounded. Viewed horizontally instead of vertically it could conceivably, by a stretch of imagination, be likened to the oöthecal structure of the living *Blaberus craniifer*.

Pruvost's two specimens are well illustrated. They are much alike and evidently belonged to the same or closely related species of whatever produced them. In 1913 he (1919, footnote, p. 247) identified one (his text fig. 35) as the tooth of a fish, *Ctenoptychius* sp., but later changed his mind in favor of a cockroach oötheca. In my untutored opinion his first thought was in the right direction. Both specimens, as oriented by Pruvost, have lower borders with small, rounded projections, and upper borders that are ragged and irregular. These borders are unlike the relatively regular, straight margins on the oöthecae of living cockroaches. By turning his illustrations upside down it is easy to imagine that they represent small, perhaps somewhat worn fish teeth with fairly distinct crown and root portions. However, an additional circumstance makes a decision difficult about the true identity of these objects. It is the ambiguous fact that abundant cockroach wings and fish remains were found in association with them. Incidentally, I also think that Pruvost was most likely mistaken in identifying his specimens on plate 4, figs. 1–5, as the pronota of an unclassified insect called *Omoptilus hispidus*. These seem to me to resemble or suggest the cephalothoraxes of such xiphosurids as *Belinurus*, *Limulus*, *Prestwichia*, and related forms (see Pruvost, pl. 23).

Laurentiaux (1951, p. 188) accepted the Pruvost specimens as authentic oöthecae and, consequently, considered them as proof that some Paleozoic cockroaches were an exception to the apparent general rule for those insects. When found entire the Paleozoic females have a fairly long ovipositor (Sellards, 1904, figs. 12, 13, 15;

Fig. 1.—Forewing or tegmen of a Paleocene cockroach from strata on Cherry Creek, 10 miles north of Terry, Mont., × 2. Fig. 2.—Egg case of an Eocene cockroach from strata 18 miles north of Wamsutter, Wyo., × 5. Fig. 3.—Forewing or elytron of a beetle from the same locality as Fig. 2, × 10.

Laurentiaux, 1951, pl. 1, figs. 2a, 2b; pl. 2, figs. 1, 2a, 2b; Zalessky, 1953, text figs. 1–7) and are, therefore, thought to have laid eggs in the fashion of some orthopterans, singly or in batches, in suitable places, instead of dropping them in a capsule, after the manner of most of our domestic cockroaches. This was the basis for the opinion that the oöthecal apparatus did not become perfected until the close of the Paleozoic or later. If now the Pruvost specimens are not oöthecae but fish teeth, Laurentiaux's arguments lose most of their force.

It would seem, therefore, that, of all these examples, the Eocene specimen I am here reporting comes closest to being an authentic cockroach egg case. No wings, except those of beetles (Fig. 3), were found with the specimen. Nevertheless, cockroaches were undoubtedly in existence there or near there at that time for their wings (Fig. 1) occur in underlying Paleocene strata of the Fort Union formation and in overlying Eocene strata of the Green River formation (Scudder, 1890, p. 216, pl. 6, fig. 25).

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The truths of the scientific church are not dogmas, but something put forward as provisional only, and which her most faithful children are welcome to disprove if they can.—S. P. Langley.